

## Measurements Made in the Study of Osteoporotic Fractures

### Baseline Clinic Visit (10/86 - 10/88)

<i>Variable</i>	<i>Measurement</i>
<b>RADIOLOGIC MEASUREMENTS</b>	
Single-photon absorptiometry	Siemens/Osteon OsteoAnalyzer
- Proximal radius	
- Ultradistal radius	
- Os Calcis	
Radiographs	
- Hand film	PA hand and wrist
- Pelvic (hip) film	AP pelvis of both hips
- Spine films	Lateral lumbar and thoracic
<b>SPECIMENS</b>	
For selected hormones and markers of bone metabolism	
- 12 cc of serum (3 aliquots)	Stored at -190° C at BRI
<b>EXAMINATIONS</b>	
Anthropometry	
- Weight	Balance beam scale
- Height	Harpender stadiometer
- Maximum adult height (knee height)	Sliding caliper
- Frame size (elbow breadth)	Sliding caliper
- Circumferences: waist and hip	Steel tape
Neuromuscular function and physical performance	
- Grip strength	Hand-grip dynamometer
- Hip abductor strength	Manual muscle testing with hand held isometric dynamometer
Quadriceps strength	
- Triceps strength	
- Gait speed/ stride length	Timed 6 meter walk
- Timed chair stands	Time to stand up five times from chair
- Timed step-ups	Timed rapid step-ups on single step
- Static balance (tandem stand)	Graded sequence of balance tasks
- Dynamic balance (tandem walk)	Timed, measured 2-meter tandem gait
- Rapid foot taps	Timed, repetitive foot tapping
Mental Status	Modified Mini-Mental State Examination
Postural blood pressure	Supine and 1 min standing BP

**Variable****Measurement**

## Visual Function

- Acuity
- Contrast sensitivity
- Depth perception  
(near and far)

Bailey-Lovie acuity targets  
Vistech VCTS  
Randot stereotests and  
Howard Dolman apparatus

**QUESTIONNAIRE AND INTERVIEWS**

## Personal and health history

- Demographic characteristics
- Personal fracture history
- Family history: fractures, kyphosis
- Falls, syncope in past 12 months
- Previous heights and weights
- Cigarette smoking
- Caffeine consumption
- Alcohol consumption
  
- Reproductive history
  
- Medical conditions
  - diabetes
  - thyroid disease
  - stroke
  - Parkinson's disease
  - arthritis
  - cataracts
  - stomach surgery
- Medications
  - diuretics (thiazide and nonthiazide)
  - thyroid hormones
  - estrogens and progestins
  - past oral contraceptives
  - vitamin D-containing supplements
  - calcium supplements
  - antacids
  - anticonvulsants
- Use of hypnotics-anxiolytics
  
- Dietary intake (current)
  - calcium, protein, phosphorus
  
  - milk

Age, ethnicity, education, marital status  
Type of fracture and age at fracture  
First degree relatives

Recall for ages 25 and 50  
Current, past for self and spouse  
Current, past: coffee, tea, cola  
Current, past: frequency and  
quantity; alcohol problems

Pregnancies, parity, age at  
menopause, surgical menopause  
breast feeding

Self-report of MD diagnosis

In-clinic review of current, past  
medications: current name and  
dose (from container), age started,  
age stopped, past names and doses

In clinic review of current name,  
dose (from container) and frequency

Block food frequency questionnaire,  
food models  
Consumption over life-cycle

***Variable***

- Physical activity
  - current exercise
  - past exercise
  - bed rest and inactivity
- Functional status
- Health status and hospitalizations
- Back pain and function
- Hip pain

***Measurement***

Paffenbarger physical activity scale  
Modified Paffenbarger over life-cycle  
Past episodes of extended bed rest  
1984 NHIS/SOA functional status items

SOF back pain and function scale  
NHANES I hip pain questions

**Year 2 Clinic Visit (V2: 1/89-12/90)**

<b><i>Variable</i></b>	<b><i>Measurement method</i></b>
<b>RADIOLOGIC MEASUREMENTS</b>	
Dual xray absorptiometry (DXA)	Hologic QDR 1000
- Proximal femur	
- AP lumbar spine	
Single-photon absorptiometry (in 500)	Siemens/Osteon OsteoAnalyzer:
- Proximal radius	
- Ultradistal radius	
- Os Calcis	
<b>SPECIMENS</b>	
For selected hormones and markers of bone metabolism	
- 4 cc of serum	Stored at -190° C at BRI
- Buffy coat	From 10 cc whole blood, at -190° C at BRI
- Timed 2 hour fasting urines (in 500)	Stored at -190° C at BRI
<b>EXAMINATIONS</b>	
Anthropometry	
- Body composition	Bioelectrical impedance
- Weight	Balance beam scale
- Height	Harpender stadiometer
- Frame size (wrist circumference)	Steel tape
- Circumferences: waist, abdomen, hip girths	Steel tape
- Thoracic curvature (in 1,000)	Flexicurve tracings
Neuromuscular function and physical performance	
- Reaction time	Response and movement time of hand and foot to light cue (Lafayette Instruments, modified model 63017)
- Lower extremity vibration threshold	Sensortek Vibratron II
- Lower extremity touch sensitivity	Von Frey Esthesiometers
- Grip strength	Hand-grip dynamometer
- Quadriceps strength	Isometric leg extension chair with load cell
- Gait speed/stride length	Timed 6 meter walk
- Timed chair stands	Time to stand up five times from chair
- Static balance (tandem stand)	Graded sequence of balance tasks
- Dynamic balance (tandem walk)	Timed, measured 2-meter tandem gait
Musculoskeletal	
- Leg, back and hand joint pain and range of motion exam	Adaptation of NHANES III joint examination protocol

**Variable****Measurement method**

Mental Status

Trail Making B,  
Digit-Symbol Substitution

Visual Function

- Acuity
- Contrast sensitivity
- Depth perception (near and distance)

Same methods as Baseline Exam  
(in those with cataract surgery since  
baseline and a random sample of controls)**QUESTIONNAIRE AND INTERVIEWS**

Contact information

- Change of address
- Change in marital status
- Change in living arrangements
- Change of personal physician

Outcomes

- Falls and injuries (past 12 months)
- Fractures (past 12 months)
- Back pain and back problems (past 12 months)

Update of risk factors

- Use of medications (current)

Same methods as Baseline Exam  
Diuretics (thiazide and nonthiazide)  
thyroid hormones, vitamin D-  
containing supplements, calcium  
supplements, corticosteroids,  
estrogens and progestins

- Cigarette smoking (current)
- Bed rest (past 12 months)
- Syncopal episodes (past 12 months)
- Current dietary intake (in 1000)  
calcium, phosphorus, protein,  
complete nutrients
- Current physical activity (in 500)

Block food frequency questionnaire

Paffenbarger activity scale

Other health history

- Brothers' fracture history
- Detailed caffeine intake
- Menstrual history
- Additional medications  
NSAIDs  
fluoride  
Calcitonin

Hip and Colles' fractures  
Current, past: coffee, tea,  
cola, adjusted for brewing method  
and serving size  
Age at menarche, menstrual cycle length  
and regularityCurrent, past  
Ever use  
Ever use

***Variable***

- Selected medical conditions
  - osteoporosis (since baseline)
  - stroke (since baseline)
  - COPD
  - kidney stones
  - gallbladder surgery
  - heart disease
  - breast disease
- Hip pain
- Functional status
- Hospital admissions (past 12 months)
- Cataract surgery (past 12 months)
- Depression
- Social Support
- Family history of stroke

***Measurement***

Same method as Baseline Exam

Same method as Baseline Exam

Health Assessment Questionnaire (HAQ)  
and NHIS-SOA battery

Geriatric Depression Scale

Lubben Social Network Scale

**Year 3.5 Clinic Visit (V3: 1/91-2/92)**

<i><b>Variable</b></i>	<i><b>Measurement method</b></i>
<b>RADIOLOGIC MEASUREMENT</b>	
Dual xray absorptiometry (DXA) (in 800) <ul style="list-style-type: none"> <li>- Lateral spine</li> <li>- AP spine</li> <li>- Hip</li> </ul>	Hologic QDR 1000 Lateral decubitus position
Radiographs <ul style="list-style-type: none"> <li>- Spine films</li> </ul>	Lateral lumbar, thoracic spine
<b>EXAMINATIONS</b>	
Anthropometry <ul style="list-style-type: none"> <li>- Weight</li> <li>- Height</li> </ul>	Balance beam scale Harpenden stadiometer
Neuromuscular function and physical performance <ul style="list-style-type: none"> <li>- Grip strength</li> <li>- Gait speed/stride length</li> </ul>	Hand-grip dynamometer Timed 6 meter walk
<b>QUESTIONNAIRE AND INTERVIEWS</b>	
Contact information <ul style="list-style-type: none"> <li>- Change of address</li> <li>- Change in marital status</li> <li>- Change in living arrangements</li> <li>- Change of personal physician</li> </ul>	
Outcomes <ul style="list-style-type: none"> <li>- Falls and injuries (past 12 months)</li> <li>- Fractures (past 12 months)</li> <li>- Back pain and back problems (past 12 months)</li> </ul>	Same method as Year 2 questionnaire
Update of risk factors <ul style="list-style-type: none"> <li>- Use of medications (current)</li> </ul>	Same method as baseline Diuretics (thiazide and nonthiazide) thyroid hormones, vitamin D- containing supplements, calcium supplements, corticosteroids, estrogens and progestins, fluoride, calcitonin, hypnotic-anxiolytics
<ul style="list-style-type: none"> <li>- Syncopal episodes (past 12 months)</li> </ul>	
Other health history <ul style="list-style-type: none"> <li>- Functional status</li> </ul>	Health Assessment Questionnaire (HAQ) and NHIS-SOA battery

***Variable***

- Additional medications
  - Didronel, etidronate
  - antidepressants
- Selected medical conditions (since last contact)
- Reasons for estrogen use/nonuse

***Measurement***

Ever use  
Current use  
Osteoporosis, stroke, kidney stones  
Symptoms, side effects, MD advice



**Year 5 Clinic Visit (V4: 9/92 - 6/94)**

<b><i>Variable</i></b>	<b><i>Measurement method</i></b>
<b>RADIOLOGIC MEASUREMENT</b>	
Dual xray absorptiometry (DXA)	Hologic QDR 1000
- AP spine (in approx. 350)	
- Hip	
Single photon absorptiometry	Siemens/Osteon Osteoanalyzer
- Calcaneus	
- Proximal and distal radius (in approx 350)	
Ultrasound	Walker Sonix
- bone velocity	
- speed of sound (in approx. 2363)	
<b>SPECIMENS</b>	
For selected hormones and markers of bone metabolism	
- 4 mL of serum (1 aliquots)	Stored at -190° C at BRI
For calcium absorption determination	Ca45 protocol as developed by
- 6 mL of serum	Dr. Bob Heaney, Creighton Univ.
Urine (fasting in 5000)	Stored at -190° C at BRI
- 4 mL	
<b>EXAMINATIONS</b>	
Anthropometry	
- Weight	Balance beam scale
- Height	Harpenden stadiometer
Neuromuscular function and physical performance	
- Grip strength	Hand-grip dynamometer
- Quadriceps strength	Isometric leg extension chair with load cell
- Gait speed/stride length	Timed 6 meter walk, usual and rapid
- Timed chair stands	Time to stand up five times from chair
- Functional reach	Equipment and protocol as developed Duncan, Weiner, and Studenski at Duke University
- Peak expiratory flow	Mini-Wright peak flow meter
- Hearing	Welch-Allyn Audioscope 3
Mental Status	Trail Making B, Digit-Symbol Substitution Modified Mini-Mental Status test
Examiner assessed frailty	

**Variable****Measurement method****Specialized cohorts:** - additional examination measurementsPerformance cohort (N=2000)

## Visual Function

- Acuity
- Depth perception (near and distance)

Same methods as Baseline Exam

## Reaction Time

## Static balance (tandem stand)

## Triceps extensor strength

## Timed manual performance

Same methods as Year 2 exam

Hand-held dynamometer  
Williams' 3 door Timed Manual  
Performance board

Body composition cohort (N=200)

## Whole body composition

## Bioelectric impedance assessment

## Circumferences: waist, abdomen, hip girths

Hologic 2000  
ValHalla 1990B Bioresistance analyzer  
Steel tape

**QUESTIONNAIRE AND INTERVIEWS**

## Contact information

- Change of address
- Change in marital status
- Change in living arrangements
- Change of personal physician

## Outcomes

- Falls and injuries (past 12 months)
- Fractures (past 12 months)
- Hip pain (past 12 months)

Same method as Year 2 questionnaire

## Update of risk factors

- Use of medications (current)

Diuretics (thiazide and nonthiazide)  
thyroid hormones, vitamin D-containing  
supplements, calcium supplements,  
corticosteroids, estrogens and progestins,  
fluoride, calcitonin, hypnotic-anxiolytics, all  
prescription and non-prescription drugs  
Currency, amount  
Currency, amount  
Hours obtained, hours needed

- Cigarette smoking (current)
- Alcohol consumption (current)
- Sleep and nap habits
- Bed rest (past 12 months)
- Syncopal episodes (past 12 months)
- Current dietary intake (in 1000)  
calcium, phosphorus, protein,  
complete nutrients
- Current physical activity

Block food frequency questionnaire

Paffenbarger activity scale

**Variable****Measurement method**

## Other health history

- Health insurance
- Weight loss
- Urine control
- Dizziness
- Dental history
- Hip replacement
- Sister's fracture history
- Caffeine intake
- Hip pain
- Hospital admissions (past 12 months)
- Depression
- Social Support
- Key Life Events

Type, medicare #  
 Planned vs unplanned  
 Ever problems, frequency, amount  
 Ever, type  
 # teeth lost/pulled (since study began)  
 Ever, reason why  
 Hip fractures update  
 Current, past: coffee, tea, cola,  
 Same method as Baseline Exam

Geriatric Depression Scale  
 Lubben Social Network Scale  
 Modified from Cardiovascular Health  
 Study stressful life events quest.

- Functional status

Health Assessment Questionnaire (HAQ)  
 and NHIS-SOA battery

- Additional medications

Didronel, etidronate  
 antidepressants  
 fluoride  
 Calcitonin

Ever use  
 Current use  
 Ever use  
 Ever use

## Extended medical history (ever diagnosed)

Presence of, current treatment (Y/N)

osteoporosis  
 pneumonia  
 stroke  
 diabetes  
 COPD  
 seizures  
 kidney stones  
 glaucoma  
 gallbladder surgery  
 cataracts  
 heart disease  
 dementia/Alzheimer's  
 thyroid disease  
 Parkinson's  
 liver disease  
 kidney disease  
 lung disease  
 ulcer  
 arthritis  
 osteoarthritis  
 rheumatoid arthritis  
 anemia  
 cancer

***Variable***

***Measurement***

Extended symptom history

Occurrence in past week, # days

Fatigue

headache

chest pains

edema

constant cough

joint stiffness

pain/discomfort

weakness/paralysis

muscle pain

poor vision

poor hearing

poor memory

**Year 8 Clinic Visit (V5: 1/95 - 6/96)**

<i><b>Variable</b></i>	<i><b>Measurement method</b></i>
<b>RADIOLOGIC MEASUREMENT</b>	
Dual xray absorptiometry (DXA) - Hip	Hologic QDR 1000
Single photon absorptiometry - Calcaneus	Siemens/Osteon Osteoanalyzer
Ultrasound	
Calcaneal	
- bone velocity	Walker Sonix UBA 575+
- speed of sound	
Tibial	
- speed of sound	Myriad Soundscan 2000
<b>EXAMINATIONS</b>	
Anthropometry	
- Weight	Balance beam scale
- Height	Harpenden stadiometer
Neuromuscular function and physical performance	
- Grip strength	Hand-grip dynamometer
- Hip abductor strength	Manual muscle testing w/hand held isometric dynamometer
- Gait speed/stride length	Timed 6 meter walk, usual and rapid
- Timed chair stands	Time to stand up five times from chair
- Timed step-ups	Timed rapid step-ups on single step
- Static balance (tandem stand)	graded sequence of balance tasks
Musculoskeletal	
- Hip and knee pain and range of motion exam	Adaptation of NHANES III joint examination protocol
Mental Status	Modified Mini-Mental Status test
Examiner assessed frailty	

**Variable****Measurement method****QUESTIONNAIRE AND INTERVIEWS**

## Contact information

- Change of address
- Change in living arrangements
- Change of personal physician
- Update two personal contacts

## Outcomes

- Falls and injuries (past 12 months)
- Fractures (past 12 months)
- Hip, knee, feet pain (last 2 years)

## Update of risk factors

- Use of medications (current)
- Cigarette smoking (current)
- Alcohol consumption (current)
- Bed rest (past 12 months)
- Current physical activity
- Caffeine intake
- Past work and occupation

## Other health history

- Urine control
- Dizziness
- Hip and knee replacement
- Reproductive health history
  - # and type of births
  - Type and reason for hysterectomy
- Functional status
- Additional medications
  - Didronel, etidronate
  - Fluoride
  - Calcitonin
  - Vitamin D
  - Tums
  - Calcium supplements
  - Multi-vitamins/iron
  - Meds for arthritis or joint pain

Same method as Year 2 questionnaire

NHANES I questionnaire  
Womac Osteoarthritis Index

Medication Inventory Form (MIF)  
collects all prescription drugs taken &  
certain non-prescription (vitamins, etc).  
Currency, amount  
Currency, amount

Paffenbarger activity scale  
Hours on feet, vigorous activity  
Current, past: coffee, tea, cola  
Hours sitting, bending, twisting,  
squatting, lifting

Ever problems, frequency, amount  
Ever, type  
ever, reason why

Health Assessment Questionnaire (HAQ)  
and NHIS-SOA battery

Last two years  
Last two years  
Last two years  
Last 30 days  
Last 30 days  
last 30 days  
Last 30 days  
last 30 days

***Variable***

***Measurement***

Extended medical history (ever diagnosed)

Presence of, current treatment (Y/N)

- osteoporosis
- dementia/Alzheimer's
- stroke
- diabetes
- COPD
- arthritis
- kidney stones
- osteoarthritis
- heart disease
- rheumatoid arthritis
- Parkinson's
- cancer

**Year 10 Clinic Visit (V6: 1/97- 9/98)**

<b><i>Variable</i></b>	<b><i>Measurement method</i></b>
<b>RADIOLOGIC MEASUREMENT</b>	
Single-photon absorptiometry - Calcaneus (subset)	Siemens/Osteon Osteoanalyzer
Dual xray absorptiometry (DXA) - Hip - Total body (year 12 cohort, AA cohort)	Hologic QDR 1000 Hologic QDR 2000
Ultrasound Calcaneal - bone velocity - speed of sound	Sahara Unit
<b>EXAMINATIONS</b>	
Anthropometry - Weight - Height	Balance beam scale Harpenden stadiometer
Neuromuscular function and physical performance - Quadriceps Strength - Grip strength - Gait speed/stride length - Timed chair stands - Pulse	Bodymaster Isometric dynamometer Timed 6 meter walk, usual and rapid Time to stand up five times from chair
Biological Specimens (after overnight fast) - Arterialized venous blood sample (1 cc) - Urine (2 x 3.5 cc, 2 hour collection, regular SOF cohort) (2 x 3.5 cc. 24 hour collection, year 12, AA cohort) - Net Acid excretion (45 cc, year 12, AA cohort) - Serum (3 x 3 cc, year 12) (2 x 3 cc, all other ppts)	Stored at -70° at BRI     Stored at -190° at BRI
Mental Status	Trail Making B Modified Mini-Mental Status test
Examiner assessed frailty	



**Variable****Measurement method****QUESTIONNAIRE AND INTERVIEWS**

## Contact information

- Change of address
- Update two personal contacts
- Next of kin

## Outcomes

- Falls and injuries (past 12 months)
- Fractures (past 2 years)

Same method as Year 2 questionnaire

## Update of risk factors

- Use of medications (current)
- Vision
- Cigarette smoking (current)
- Alcohol consumption (current)
- Current physical activity
- Caffeine intake
- Sleep patterns
- Naps
- Depression

Medication Inventory Form (MIF)  
collects all prescription drugs taken &  
certain non-prescription (vitamins, etc).  
difficulties in daily activities  
Frequency, amount  
frequency, amount  
Paffenbarger activity scale  
distance, hours sitting  
Current: coffee, tea, cola  
Minutes until asleep, time wake  
up/fall asleep, hours per night,  
problems associated with, frequency  
Y/N, how often, how long  
Geriatric Depression Scale

## Other health history

- Functional status
- Additional medications
  - Didronel, etidronate
  - Fluoride
  - Calcitonin
  - Alendronate
- Self-reported Health Status

Health Assessment Questionnaire (HAQ)  
and NHIS-SOA battery

Last two years

Last two years

Last two years

Last two years

## Extended medical history (ever diagnosed)

osteoporosis  
dementia/Alzheimer's  
stroke  
diabetes  
COPD  
arthritis  
hyperthyroidism  
osteoarthritis  
heart disease  
rheumatoid arthritis  
Parkinson's

Presence of, current treatment (Y/N)

***Variable******Measurement***

Extended medical history (cont.)  
 high blood pressure  
 breast cancer

Presence of, current treatment (Y/N)  
 (if Y, SOF Breast Cancer Questionnaire)  
 -breast cancer presence in natural  
 mother/sisters (age), last mammogram:  
 where, result, recommendation

Diet

Current, '95 Block FFQ  
 Frequency and amount

**VISION TESTING**

Ocular History

Vision Testing

Contrast Sensitivity

Visual Acuity

Humphrey Autolensometer

Humphrey Autorefractor

Humphrey 76-Point Automated Visual Field

Tonopen/Intraocular Pressure Measurement

SOF-ES Eye Photography

- Fundus Photos (Canon CR-45UAF)
- Slit Lamp Lens Photos (Topcon SL-7E)
- Marcher Retro-Illumination Lens Photos

**Year 12 Clinic Visit (V7: 4/99- 12/99)**  
(African American cohort and year-12 subset)

<i><b>Variable</b></i>	<i><b>Measurement method</b></i>
<b>RADIOLOGIC MEASUREMENT</b>	
Dual xray absorptiometry (DXA)	
- Hip	Hologic QDR 1000
- Total body	Hologic QDR 2000
Radiographs	
- Spine films (AA cohort)	Lateral lumbar, thoracic spine
Ultrasound	
Calcaneal	Sahara Unit
- bone velocity	
- speed of sound	
<b>EXAMINATIONS</b>	
Anthropometry	
- Weight	Balance beam scale
- Height	Harpenden stadiometer
Neuromuscular function and physical performance	
- Quadriceps Strength	Bodymaster
- Grip strength	Isometric dynamometer
- Gait speed/stride length	Timed 6 meter walk, usual and rapid
- Timed chair stands	Time to stand up five times from chair
Biological Specimens (after overnight fast)	
- Urine (2 x 3.5 cc, 24 hour collection)	Stored at -70° at BRI
- Buffy coat (AA cohort)	Stored at -190° at BRI
- Serum (4 x 1 cc)	Stored at -190° at BRI
Examiner assessed frailty	

**Variable****Measurement method****QUESTIONNAIRE AND INTERVIEWS**

## Contact information

- Change of address
- Update two personal contacts
- Next of kin

## Outcomes

- Falls and injuries (past 12 months)
- Fractures (past 2 years)

Same method as Year 2 questionnaire

## Update of risk factors

- Use of medications (current)
- Current physical activity

Calcium, estrogen, bone medications, statins,  
and others  
Walk for exercise

## Other health history

- Functional status (AA cohort)
- Self-reported Health Status
- Back pain / back function (AA cohort)

Health Assessment Questionnaire (HAQ)  
and NHIS-SOA battery

## Extended medical history (ever diagnosed)

osteoporosis  
dementia/Alzheimer's  
stroke  
diabetes  
COPD  
arthritis  
hyperthyroidism  
osteoarthritis  
heart disease  
rheumatoid arthritis  
Parkinson's  
high blood pressure  
breast cancer

Presence of, current treatment (Y/N)

**VISION TESTING**

## Ocular History

## SOF-ES Eye Photography

- Fundus Photos (Canon CR-45UAF)

**Year 16 Clinic Visit (V8: 01/02- 04/04)**

<i><b>Variable</b></i>	<i><b>Measurement method</b></i>
<b>RADIOLOGIC MEASUREMENT</b>	
Dual xray absorptiometry (DXA)	
- Hip	Hologic QDR 1000, 2000
Radiographs	
- Spine films	Lateral lumbar, thoracic spine
<b>EXAMINATIONS</b>	
Anthropometry	
- Weight	Balance beam scale
- Height	Harpenden stadiometer
- Hip, neck, waist circumference (PSG subset)	
- Blood Pressure (PSG subset)	
Neuromuscular function and physical performance	
- Grip strength	Isometric dynamometer
- Gait speed/stride length	Timed 6 meter walk, usual and rapid
- Timed chair stands	Time to stand up five times from chair
- Pulse	
Sleep	
Wrist Actigraphy	
- Average 4 nights/5 days actigraphy data	Ambulatory Monitoring Inc. Sleep-Watch® O
Polysomnography (in-home, subset of 500)	Siesta® by Compumedics
Biological Specimens	
- Whole blood (2x5 ml)	Stored at -190° at BRI
- Blood blotters (2)	
- Serum (4 x 1 ml, Polysomnography subset)	
Mental Status	
	Trail Making B
	Modified Mini-Mental Status test
Vision	
	Functional Vision, Contrast Sensitivity, Autorefractor, Eye Photo, Intraocular Pressure

**QUESTIONNAIRE AND INTERVIEWS**

## Contact information

- Change of address
- Update two personal contacts
- Next of kin

## Outcomes

- Falls and injuries (past 12 months)
- Fractures (past 2 years)

Same method as Year 2 questionnaire

## Update of risk factors

- Use of medications (current)

Medication Inventory Form (MIF) collects all prescription and non-rx drugs (vitamins, etc).

- Exercise

Blocks walked, household chores, regular Activity, time sitting/watching TV, weight loss

- Cigarette smoking (current)
- Alcohol consumption (current)
- Current physical activity

Frequency, amount  
frequency, amount

- Caffeine intake

Paffenbarger activity scale  
distance, hours sitting

## Sleep patterns

Current: coffee, tea, cola

- Naps
- Depression
- Anxiety

Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, Functional Outcomes of Sleep Questionnaire, minutes until asleep, time wake up/fall asleep, hours per night, problems associated with, frequency

Y/N, how often, how long

Geriatric Depression Scale

Goldberg Anxiety Scale

## Other health history

- Functional status

Health Assessment Questionnaire (HAQ) and NHIS-SOA battery

- Self-reported Health Status
- Hip and Knee Health (replacements)

## Extended medical history (ever diagnosed)

Presence of, current treatment (Y/N)

osteoporosis  
dementia/Alzheimer's  
stroke  
diabetes  
depression  
COPD  
arthritis  
hyperthyroidism  
osteoarthritis  
heart disease  
rheumatoid arthritis

Parkinson's  
Neurological disease  
high blood pressure  
sleep disorders  
colon cancer  
lung cancer  
breast cancer

(if Y, SOF Breast Cancer Questionnaire)  
-breast cancer presence in natural  
mother/sisters (age), last mammogram:  
where, result, recommendation

Other information  
Marital Status  
Type of Residence/Living Situation

**Year 20 Clinic Visit (V9: 01/07-6/08)**

<b><i>Variable</i></b>	<b><i>Measurement method</i></b>
<b>RADIOLOGIC MEASUREMENT</b>	
Dual xray absorptiometry (DXA)	Hologic QDR 4500
- Whole body	
- Hip	
<b>EXAMINATIONS</b>	
Anthropometry	
- Weight	Balance beam scale
- Height	Harpenden stadiometer
- Blood Pressure	
- Pulse	
Neuromuscular function and physical performance	
- Reaction time	Response time of hand to light cue (PVT-192, Ambulatory Monitoring, Inc.)
- Grip strength	Isometric dynamometer
- Gait speed/stride length	Timed 6 meter walk, usual and rapid
- Timed chair stands	Time to stand up five times from chair
- Static balance (tandem stand)	Graded sequence of balance tasks
Biological Specimens	
- Whole blood (2x4.5 ml)	Stored at -190° at study sites
- Serum (8x0.5 ml)	
Mental Status/Cognitive Function	Trail Making B Modified Mini-Mental Status Test California Verbal Learning Test Digit Span Category and Verbal Fluency Exam
<b>QUESTIONNAIRE AND INTERVIEWS</b>	
Contact information	
- Change of address	
- Update two personal contacts	
- Next of kin	
Outcomes	Same method as Year 2 questionnaire
- Falls and injuries (past 12 months)	
- Fractures (past 2 years)	
Update of risk factors	
- Use of medications (current)	Medication Inventory Form (MIF) collects all prescription drugs.



- Exercise
- Cigarette smoking (current)
- Alcohol consumption (current)
- Caffeine intake (current)

Medication Use Form collects information on non-rx drugs  
 Weight loss, blocks walked, time sitting/watching TV  
 Y/N  
 Frequency, amount  
 Coffee, tea, cola

Mobility

Life Space Questionnaire

Sleep patterns

- Naps
- Depression
- Anxiety

Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, minutes until asleep, time wake up/fall asleep, hours per night, problems associated with, frequency  
 Y/N, how often, how long  
 Geriatric Depression Scale  
 Goldberg Anxiety Scale

Other health history

- Functional status
- Self-reported Health Status
- Bodily Pain
- Back Pain

Health Assessment Questionnaire (HAQ)

Extended medical history (ever diagnosed)

- osteoporosis
- dementia/Alzheimer's
- stroke
- diabetes
- COPD
- arthritis
- osteoarthritis
- rheumatoid arthritis
- Parkinson's disease
- high blood pressure
- heart attack
- angioplasty
- congestive heart failure
- peripheral vascular disease

Presence of, current treatment (Y/N)

Functional Assessment

Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE)

Other information

- Marital Status
- Type of Residence/Living Situation

**ADDITIONAL MEASURES FOR SLEEP/COGNITION VISIT**

Wrist Actigraphy

Average 4 nights/5 days actigraphy data

Octagonal Motionlogger SleepWatch  
(catalog no. 26.100)

Oximetry

Masimo Rad8 Signal Extraction Pulse  
Oximeter

Sleep Patterns

Functional Outcomes of Sleep Questionnaire

Restless Legs Syndrome

Questionnaire

Visual Acuity

Bailey-Lovie Exam

## Follow-Up

<i>Variable</i>	<i>Measurement</i>
	FIRST (1987-1989) AND THIRD (1990) ANNUAL QUESTIONNAIRE AND TELEPHONE INTERVIEW (for analysis purposes, first annual data are included in the baseline (V1) dataset and third annual data are included in the visit 3 (V3) dataset)
Contact information	
<ul style="list-style-type: none"> <li>- Change of address</li> <li>- Change in marital status</li> <li>- Change in living arrangements</li> <li>- Change of personal physician</li> </ul>	
Endpoints	
<ul style="list-style-type: none"> <li>- Falls and injuries (past 12 months)</li> <li>- Fractures (past 12 months)</li> <li>- Back pain and back problems (past 12 months)</li> </ul>	<p>Same questions as Baseline</p> <p style="text-align: center;">“</p> <p style="text-align: center;">“</p>
Update of risk factors	
<ul style="list-style-type: none"> <li>- Medications (current)</li> <li>- Selected medical conditions (since last contact)</li> <li>- Medical condition checklist</li> <li>- Functional status (current)</li> <li>- Bed rest (past 12 months)</li> <li>- Syncopal episodes (past 12 months)</li> </ul>	<p>Diuretics (thiazide and nonthiazide) thyroid hormones, seizure, vitamin D- containing supplements, calcium supplements, antacids, corticosteroids, estrogens and progestins, fluoride calcitonin, hypnotic-anxiolytics) Osteoporosis, stroke, kidney stones</p> <p>Health Assessment Questionnaire (HAQ) and NHIS-SOA battery</p> <p>Same questions as Baseline</p> <p style="text-align: center;">“</p>
Other	
<ul style="list-style-type: none"> <li>- Hip pain</li> <li>- Family history of breast cancer</li> <li>- Breast examinations</li> <li>- Cataract surgery (past 12 months)</li> <li>- Hospital and nursing home admissions (past 12 months)</li> </ul>	Same questions as Baseline
	QUARTERLY POSTCARD (1986 – 2009)
<ul style="list-style-type: none"> <li>- Falls in past four months</li> <li>- Fractures in past four months</li> <li>- Change of address</li> </ul>	

## BI-ANNUAL PHONE QUESTIONNAIRE (2009 – PRESENT)

<i>Variable</i>	<i>Measurement</i>
Outcomes	
- Falls	
- Fractures	
Health history	
- Hospitalizations	
- Stroke	
Other health history	
- Functional status	Health Assessment Questionnaire (HAQ)
- Self-reported health status	
- Walk for exercise	
Mental Status/Cognitive Function	
- Cognitive impairment	Three word recall (MMSE) Category and Verbal Fluency Exam
- Memory	
- Positive affect / optimism	
Other information	
- Marital status	
- Type of residence/living situation	
- Social network	

## **Outcomes / Endpoints**

### FRACTURES

- |   |   |
|---|---|
| - Nonspine fractures                              | Radiologist's report for all fractures,<br>Hip fracture: copy of xray |
| - Vertebral fractures                             | Repeat lateral lumbar and thoracic<br>spine xrays at Year 3.5 visit   |
| - Type of trauma and<br>circumstances of fracture | Post-fracture telephone interview                                     |

### INCIDENT BREAST CANCER

Incident breast cancer cases (comparison of First annual and questionnaires at following visits)  
Hospitalization information  
Biopsy  
Diagnosis and procedure information  
Tumor behavior  
Diagnostic confirmation status  
Staging of tumor  
Estrogen and Progesterone receptor assay status

### OTHER OUTCOMES

Incident hip osteoarthritis (radiographic evidence comparing Visit 1 and Visit 5 hip xrays)  
Incident stroke cases (validated from medical records through Visit 5)